WE CLAIM:

CLAIMS

1.   In a personal area network (PAN), a method for
5   actively evaluating and adjusting device energy consumption, the method
comprising:

polling devices in the PAN to determine respective energy
metrics; and,

establishing network communications between devices using
10   the energy metrics.

2.   The method of claim 1 wherein establishing network
communications between devices using the energy metrics includes
minimizing energy consumption for devices with low energy metrics.
15

3.   The method of claim 2 wherein polling devices in the
personal area network to determine respective energy metrics includes
polling devices in a Bluetooth wireless communications network.

20   4.   The method of claim 3 wherein polling devices in a
Bluetooth wireless communications network includes establishing a
piconet with one device functioning as a master device and at least one
other device functioning as a slave device; and,

wherein establishing network communications between
25   devices using the energy metrics includes the master device establishing

network communications rules between devices to optimize device battery life.

5.   The method of claim 4 wherein establishing a piconet with one device functioning as a master device and at least one other device functioning as a slave device includes:

the slave devices supplying identification data to the master device; and,

the master device retrieving device energy metric data from memory in response to the slave device identification data, the device energy metric data including available device data for those slave devices unable to support the energy metric exchange.

6.   The method of claim 4 wherein establishing a piconet with one device functioning as a master device and at least one other device functioning as a slave device includes:

the slave devices supplying energy metric data to the master device, the device energy metric data including available device data for those slave devices unable to support the energy metric exchange.

7.   The method of claim 4 wherein polling devices in a Bluetooth wireless communications network to determine respective energy metrics includes:

determining if devices are powered by battery; and,

identifying the battery charge status for each device powered by battery; and,

wherein the master device establishing network communications rules between devices to optimize device battery life includes:

determining a priority of operation for the devices in the

5   network; and,

establishing network communication rules in response to device battery charge status and device priority of operation.

8.   The method of claim 7 wherein identifying battery

10   charge status for each device powered by battery includes:

determining the charge remaining on the device batteries; and,

determining whether the device is connected to a battery charger.

15

9.   The method of claim 8 wherein the master device establishing network communications rules between devices to optimize device battery life includes modifying a device link state; and,

wherein modifying the device link state includes modifying

20   device scan rate, device mode setting, and the function of the device as a slave or master in the piconet.

10.   The method of claim 9 wherein polling devices in a Bluetooth wireless communications network to determine respective

25   energy metrics includes determining a link energy metric associated with network link communication functions selected from the group including

receiving, transmitting mode, standby, required average data rate, burst data rate, peak data rate, latency requirements, scan rates, and link reliability.

5   11.   The method of claim 10 wherein the master device establishing network communications rules between devices to optimize device battery life includes establishing network communication rules in response to the link energy metric.

10   12.   The method of claim 11 wherein polling devices in a Bluetooth wireless communications network to determine respective energy metrics includes:

determining an idle mode energy consumption rate associated with inherent functions of the devices;

15   determining a working mode energy consumption rate associated with inherent functions of the devices;

determining an operational energy metric in response to a probability of the devices being in the working mode; and,

wherein the master device establishing network

20 communications rules between devices to optimize device battery life includes establishing network communication rules in response to the operational energy metric.

13.   The method of claim 12 wherein determining a

25 working mode energy consumption rate includes determining energy consumption for functions selected from the group including

21

communicating, displaying video images, performing calculations, printing, producing audio output, and operating motors and fans.

14.   The method of claim 13 further comprising:

5   selecting manual override functions including establishing optional device operations and enhancing the performance of existing device operations; and,

wherein the master device establishing network communications rules between devices to optimize device battery life

10   includes establishing network communication rules in response to the manual override selections.

15.   The method of claim 3 wherein polling devices in a Bluetooth wireless communications network includes establishing a

15   scatternet including at least two piconets; and,

wherein establishing network communications between devices using the energy metrics includes establishing network communications between devices in response to negotiations between the piconets.

20

16.   The method of claim 4 wherein establishing a piconet with one device functioning as a master device and at least one other device functioning as a slave device includes establishing an ad hoc point-to-multipoint piconet and an ad hoc point-to-point piconet.

25

17.   The method of claim 13 wherein polling devices in a

Bluetooth wireless communications network to determine respective

energy metrics includes determining a network battery ratio, the network

battery ratio comparing device battery charge status, device priority of

5   operation, and the combination of the link energy metric and the

operational energy metric;   and,

wherein the master device establishing network

communications rules between devices to optimize device battery life

includes comparing network battery ratios.

10

18.   In a Bluetooth wireless communications network, a

method for actively evaluating and adjusting device energy consumption,

the method comprising:

establishing a piconet with one device functioning as a

15   master device and at least one other device functioning as a slave device;

polling devices to determine respective energy metrics;

determining a priority of operation for each device in the

network;

identifying a battery charge status for each device powered

20   by battery;

determining a link energy metric associated with network

link communications; and,

the master device modifying a link state between devices to

optimize device battery life in response to the battery charge status, the

25   device priority of operation, and the link energy metric.

19.   In a personal area network, a system for actively evaluating and adjusting device energy consumption, the system comprising:

a plurality of devices communicating in a wireless

5   communications network; and,

wherein a first device polls other devices to determine respective energy metrics, and establishes network communications between devices in response to determining the energy metrics.

10   20.   The system of claim 19 wherein the first device establishes network communications between devices to minimizing energy consumption for devices with low energy metrics.

21.   The system of claim 20 wherein the plurality of devices

15   communicate in a Bluetooth wireless communications piconet; and,

wherein the first device functions as a master device to establish network communications rules with at least one slave device.

22.   The system of claim 21 wherein the master device

20   polls the slave devices to receive slave device identification data;

wherein the master device retrieves energy metric data from memory in response to receiving the identification data; and,

wherein device energy metric data includes available device data for those slave devices unable to support the energy metric exchange.

25

23.   The system of claim 21 wherein the master device polls the slave devices to receive slave device energy metric data; and,

wherein device energy metric data includes available device data for those slave devices unable to support the energy metric exchange.

5

24.   The system of claim 21 wherein the master device has a calculator accepting slave device energy metrics and supplying energy consumption rules to optimize device battery life in response to the slave device energy metrics; and,

10   wherein each slave device has a controller accepting the energy consumption rules and an output for controlling energy use in response to the energy consumption rules.

25.   The system of claim 24 wherein the calculator accepts

15   energy metrics from each slave device including a device battery charge status for devices powered by battery; and,

wherein the battery charge status includes the charge remaining on the battery and whether the device is connected to a battery charger.

20

26.   The system of claim 25 wherein the calculator determines a priority of operation for devices in the network; and,

wherein the calculator supplies energy consumption rules to optimize device battery life in response to device battery charge status

25   and device priority of operation.

27.   The system of claim 26 wherein the calculator modifies link states as part of the energy consumption rules to optimize device battery life; and,

wherein link states include device scan rate, device mode

5   setting, and the function of the device as a slave or master in the piconet.

28.   The system of claim 27 wherein the calculator accepts slave device link energy metrics for energy consumption associated with

10   network link communications functions selected from the group including receiving, transmitting, standby, required average data rate, burst data rate, peak data rate, latency requirements, scan rates, and link reliability; and,

wherein the calculator supplies energy consumption rules to

15   optimize device battery life in response to the link energy metrics.

29.   The system of claim 28 wherein the calculator accepts operational energy metrics from the slave devices for:

an idle mode energy consumption rate associated with

20   inherent functions of the devices;

a working mode energy consumption rate associated with inherent functions of the devices; and,

a probability of the slave devices operating in the working mode.

25

30.   The system of claim 29 wherein the calculator supplies energy consumption rules to optimize device battery life in response to the operational energy metrics.

5   31.   The system of claim 30 wherein the working mode energy consumption rate is selected from the group of functions including communicating, displaying video images, performing calculations, printing, producing audio output, and operating motors and fans.

10   32.   The system of claim 31 wherein the calculator accepts manual override function selections, the manual override functions including establishing optional device operations and enhancing the performance of existing device operations; and,

        wherein the calculator supplies energy consumption rules to
15   optimize device battery life in response to the manual override selections.

        33.   The system of claim 21 wherein the plurality of devices communicating in a Bluetooth wireless communications piconet includes at least two piconets communicating to form a scatternet; and,

20   wherein energy consumption rules are supplied in response to negotiations between the two piconets.

        34.   The system of claim 31 wherein the master device polls the slave devices to determine a network battery ratio of battery
25   charge status and priority of operation compared with the combination of the link energy metric and the operational energy metric; and,

wherein the master device supplies energy consumption rules to optimize device battery life in response to the comparison of network battery ratios.

5   35.   In a personal area network, a system for actively evaluating and adjusting device energy consumption, the system comprising:

a first device functioning as a master device to establish network communications rules with at least one slave device in a

10   Bluetooth wireless communications piconet;

wherein the master device has a calculator supplying energy consumption rules to minimize energy consumption for devices with low energy metrics in response to priority of operation for devices and slave device energy metric data including:

15   whether devices are powered by battery;

for those device powered by battery, the charge remaining on the battery and whether the device is connected to a battery charger; and,

link energy metrics for energy consumption associated with network link communications;

20   wherein the slave devices have controllers supplying outputs to modify slave device link states in response to the energy consumption rules; and,

wherein link states include device scan rate, device mode setting, and the function of a device as a slave or master in the piconet

25